SOLENO INC

QUALITY SYSTEMS MANUAL
EASTERN STATES CONSORTIUM HDPEP PROGRAM

NY, CT, DE, DC, ME, MD, MA, NC, NH, NJ, PA, RI, VT & VA

1.0 INTRODUCTION

This manual was developed and established by SOLENO Inc. in order to describe the procedures pertaining to quality control in its plants. This manual contains the general outline of all quality control procedures, from the choice of resins (including receiving and storage) to the production of pipe (including the identification of manufacturing defects and statistical controls, handling, storage up to delivery).

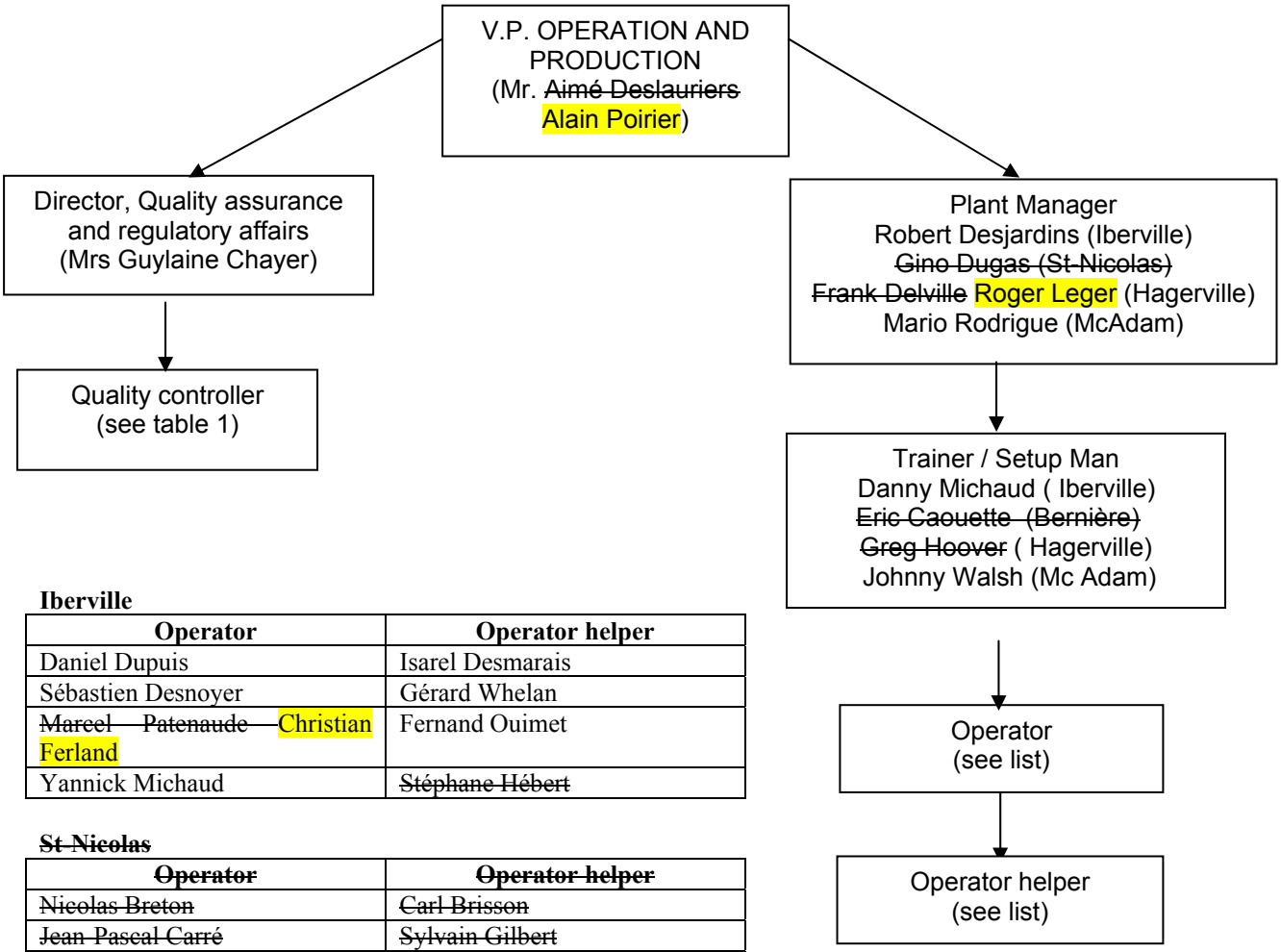
SOLENO Inc. has implemented a high level of quality control in each of its plants. This complete and detailed quality control of production facilitates the rapid and precise detection of non-compliance. It also permits the personnel of SOLENO to identify the causes and the extent of cases of non-compliance and to undertake the necessary measures to eliminate them. These quality control procedures, that exceed the requirements of current standards, ensure an extensive body of documentation as required to limit liability and to allow for the issuance of guarantees both on the material and workmanship of product.

Table 1 contains a list of manufacturing plants, outlining the sizes and types of product made by each facility and including addresses and telephone numbers of each plant (laboratory at each plant).

Table 1

	IBERVILLE 1160, route 133 CP 837 Succ Iberville St-Jean sur Richelieu QC J2X 4J5 Tel: 450-347-7855 QC: Chantal Hébert Dominique Fortin José Riendeau	~~**ST-NICOLAS**~~ ~~1185 ch. Industriel~~ ~~St-Nicolas, QC~~ ~~G7A 1B2~~ ~~Tel: 418-447-6075~~ ~~QC: Marc Plante~~	**MARITIMES** 64, Northlane Mc Adam, N-B E6J 1K6 Tel: 506-784-1888 QC: Steven Garner	**ONTARIO** RR #5 (Building 7) 304 concession 11 Hagersville, ON N0A 1H0 Tel: 905-768-7473 QC: ~~Nathan Duxbury~~ Matt Rulli The plant will Close in September 06
Single wall	100 to 300 mm	~~100 to 450 mm~~	100 to 600 mm	300 to 600 mm
Double wall	100 to 1200 mm	~~100 to 450 mm~~	300 to 1200 mm	300 to 1200 mm

The Director of Quality Assurance for SOLENO (GUYLAINE CHAYER) is responsible for staff management, qualification of technicians (quality controllers), management of laboratory equipment, and for obtaining and maintain accreditation. See the Appendix I for resume.



Iberville

Operator	Operator helper
Daniel Dupuis	Isarel Desmarais
Sébastien Desnoyer	Gérard Whelan
~~Marcel Patenaude~~ Christian Ferland	Fernand Ouimet
Yannick Michaud	~~Stéphane Hébert~~

~~**St-Nicolas**~~

~~Operator~~	~~Operator helper~~
~~Nicolas Breton~~	~~Carl Brisson~~
~~Jean-Pascal Carré~~	~~Sylvain Gilbert~~
~~Danny Carrier~~	~~Mathieu Boivert~~
~~Jean Tremblay~~	~~Pierre Rousseau~~

Hagersville

Operator	Operator Helper
Matt Gale	Bob Galchrist
Richard Stackhouse	Nil Suggett
Kevin Propper	Wayne Dosser
Rob Helmer	Jeffrey Hinds

Mc Adam

Operator	Operator Helper
Wayde Fudge	Craig Rushton
David Walsh	Troy Lunn
Rolland Bigger	Frankie Cleghorn
Barry Lanking	Alfred Gardner

2.0 QUALITY POLICY

The following quality policy statement is posted at strategic locations throughout the SOLENO facilities. Furthermore, the quality mission statement is presented to new employees during their initial training.

The quality policy of SOLENO is based on the desire to maximize customer satisfaction. We are therefore committed to serving our client through the careful management of our work process, paying special attention to the continual improvement of quality by seeking to attain the highest level of standards for our products, by respecting deadlines and cost controls, while making the improvement of our resources and structures a priority.

Our conformity to the ISO 9001-2000 standard (system of quality management) to which we adhere assures the stringency of our quality process and serves as a permanent reference to our commitment to continual quality improvement.

To encourage worker loyalty and motivation, SOLENO practices a policy of cooperation and transparency with employees for all work requirements.

3.0 QUALITY CONTROL OF RAW MATERIALS

3.1 GENERALITIES

SOLENO begins its quality control with raw materials. We use resins that are either natural or pre-mixed with carbon black. The carbon black is added by SOLENO if the resin is not pre-mixed. These resins are usually delivered to the production plants by truck, each one with an approximate capacity of 30,000 kg. Each truck has a lot number to facilitate the identification and traceability of the resin. This number corresponds with SOLENO's purchase order number.

Each manufacturer of resin provides a certificate of analysis to SOLENO's quality department for approval, indicating the results obtained for the following characteristics:
Density ASTM D 1505 (one test per lot)
Melt index ASTM D 1238 (one test per lot)
Carbon black content ASTM D 4218 (where applicable)
NCLS (~~when furnished~~ Provided by the resin supplier, each three month)

Our resin supplier provides SOLENO with a test report for each lot produced over several truck loads. If different lots of resin from different suppliers of resin are blended, SOLENO inc will provide a monthly test report including the above tests. All resin test reports and certificates provided by the resin supplier, as well as reports for samples tested by SOLENO are retained and available for review for a period of 5 years.

The carbon black content is applicable if the resin is pre-mixed. When the resin is not pre-mixed, the carbon black is added by SOLENO during the manufacture of pipe.

3.2 RESIN TESTS CONDUCTED BY SOLENO

All resins used in SOLENO pipe must have their physical integrity evaluated before they can be released for production. All incoming trucks are sampled by the SOLENO quality controller. He use the loading pipe under the truck that the SOLENO plant. All Incoming trucks are sampling plant. Upon verification of resin compliance with the specifications, the resin is pumped from the truck into the appropriate silos.

1. ~~Resin samples (in plastic bags) are taken during the truck loading at the resin plant.~~ ——All incoming trucks are sampled by the SOLENO quality controller under the truck.
2. ~~Resin samples are delivered to the laboratory by the truck driver.~~ The following tests are performed and compared to SOLENO specifications. (Appendix II for the test result form EQ-QUA-08)

Density ASTM D 792 (IT-QUA-03)
Melt index ASTM D 1238 (IT-QUA-03)
Carbon black content ASTM D 4218 (IT-QUA-04) (where applicable)

3. After verification that the product meets production specifications (per AASHTO M294), the resin is pumped from the truck into a silo dedicated to that material.
4. Off-spec material is returned to the supplier

3.3 STORAGE OF RESIN

When the results of the tests conducted on the resin are approved, the resin is stored in silos, as per Job Instruction IT-QUA-01.

3.4 RESINS TO MANUFACTURE FITTINGS AND COUPLINGS

The resin used to manufacture the fittings and couplings, SOLENO will be able to traceability the resin lot used to manufacturer it.

4 QUALITY CONTROL OF PIPE

4.1 MANUFACTURING PROCESS

SOLENO Inc has ~~four~~ two plants, ~~two~~ one in the province of Quebec, ~~one in Ontario~~ and one in New Brunswick. SOLENO manufactures three types of pipe: corrugated flexible pipe for drainage (A), single-wall corrugated pipe (B) and open profile, smooth interior corrugated pipe (C). The pipe manufactured by SOLENO plants spans the range from 1-1/2” to 48” in diameter, according to the type of pipe.

SOLENO uses the following tradenames for each type of pipe:
Drain (A) for sale in US markets complying with ASTM F405 or F667 standards
Uniflo (B) for sale in US markets complying with AASHTO M252 or M294 standards
Unimax (C) for sale in US markets complying with AASHTO M252 or M294 standards

4.2 QUALITY CONTROL

4.2.1 TEST METHODS

SOLENO uses recognized test methods, published by ASTM, BNQ, CSA and AASHTO. The characteristics are tested according to Job Instructions (designated by prefix IT) established by SOLENO. These Job Instructions describe testing methods for all products, while strictly adhering to AASHTO M252 and M294 standards as well as applicable BNQ, CSA or ASTM standards.

4.2.2 FREQUENCY OF TESTS

SOLENO defines a production lot as the quantity of pipe of the same size, type and designation that is manufactured on the same production line over a period of time not exceeding 24 consecutive hours. SOLENO takes samples directly during the manufacturing process according to a pre-established frequency. Each sample is matched to its respective lot using a unique numbering system in the following way:

~~Stiffness Classification~~
~~Production Line number~~
~~Work team number~~
Date (Day/ Month/Year)
Time
Weight

The plant code marked on the pipe completes the lot identification and insures full tracability of any pipe or sample that SOLENO produces at any of its plants (see also section 10).

Samples are conditioned at a temperature of 23 ± 2° C for a period of at least 24 hours prior to test, unless otherwise indicated by the Job Instruction. Table 2 indicates the number of specimens per 24 hours unless otherwise noted.

TABLE 2 (the number of specimens per 24 hours unless otherwise noted)

	ASTM/AASHTO Method	ISO Procedure	AASHTO M252	AASHTO M294	AASHTO M252	AASHTO M294
			Uniflo	Uniflo	Unimax	Unimax
Type			C or CP	C or CP	S or SP	S or SP
Outside Dia.	D2122	IT-QUA-10	2/2*	2/2*	2/2*	2/2*
Inside Dia.	D2122	IT-QUA-10	2/2*	2/2*	2/2*	2/2*
Unit weight		IT-QUA-10	3/shift**	3/shift**	3/shift**	3/shift**
Stiffness 5%	D2412	IT-QUA-02	~~3~~1	~~3~~1	~~3~~1	~~3~~1
Weld integrity of joints		IT-QUA-02	~~3~~1	~~3~~1	~~3~~1	~~3~~1
Compression strength		IT-QUA-02	~~3~~1	~~3~~1	~~3~~1	~~3~~1
Impact (brittleness)	D2444	IT-QUA-05	~~3~~1	~~6~~1	~~3~~1	~~6~~1
Carbon Black	D4218	IT-QUA-04	1	1	1	1
Low Temperature Flexibility	M252	IT-QUA-09	~~3~~ 1 samples / week~~***~~	N/A	N/A	N/A
Elongation	D2444	IT-QUA-07	~~3~~ 1 samples / week	N/A	N/A	N/A
Melt	D1238	IT-QUA-03	1	1	1	1
Density	D792	IT-QUA-03	1	1	1	1
Perforation area / Water inlet area	Type 1, 2, CP, and SP	IT-QUA-10	1 per shift	1 per shift	1 per shift	1 per shift
ESCR	D1693	IT-QUA-06	1 per week	1 per week	1 per week	1 per week
Wall Thickness	D2122	IT-QUA-10	3 samples / shift	3 samples / shift	3 samples / shift	3 samples / shift
Distribution outside	D2122	IT-QUA-10			1	1
Distribution Inside	D2122	IT-QUA-10			1	1
Appearance out/in	M252/M294		Quality Controller : 3 times by shift Operator: during entire manufacturing process			
Marking	M252/M294					
Length		IT-QUA-10				
Joint Integrity	M252	EQ-QUA-10	1 per week		1 per week	
	M294	EQ-QUA-11		1 per week		1 per week

* - shared inspections by Operator / Quality Controller, reported on forms EQ-QUA-07, EQ-QUA-12 and EQ-PRO-05 except for the Iberville factory where the inspection is done only by the quality controller

** - inspections by Operator

~~*** - At of the date of this revision, Soleno does not make coiled pipe and does not perform this test.~~

~~5 TEST DATA~~ TEST RESULTS STATISTICAL ANALYSIS

All test results are incorporated into a database. Each month, a report is generated. That report shows the average value of all tested parameters, per lot, per production line, per factory. The information contained in the report is used to follow the production tendencies and if necessary correct any deviation. ~~If certificates of compliance are requested, they are issued from this database. Specific reports can also be generated concerning product types, manufacture dates, diameters, lots of resin, etc. from the database. All this data permits the traceability from the raw material to its final utilization. The hard copy of these documents is kept on file for five years. (see Appendix III, EQ-QUA-07 Appendix IV, EQ-QUA-10 Appendix V, EQ-QUA-11 and Appendix VI, EQ-PRO-05 for test results records)~~

6 NON-COMPLIANT MATERIAL

All pipe exhibiting signs of damage, or pipe that does not meet the appropriate standards is identified as non-compliant and stored separately from the rest of the inventory. A non-compliance report is generated for each one of the non-compliance, and serves to identify the nature of the non-compliance. All products made since the last successful test is quarantined until it can be evaluated in order to determine the extent of the non-compliance. The only personnel who have the authority to evaluate non-compliant product are the V.P. of Operations and the Quality Assurance Director. Based on the evaluation, each case will be classified as follows:

Rejected: the pipe is ground into small pieces and used for future production

Localized damage: The damaged surface is removed and the pipe is dispositioned as compliant

Downgraded: the pipe is re-classified as a different type of product than that for which it was originally manufactured. The markings are then changed accordingly.

Used by exemption: the pipe can be used on a project if it is approved by the client. The marking is removed.

The reason for the failure must be documented in the inspection during the manufacturing process report along with the number for the non-compliance report.

7 TRACEABILITY OF PRODUCT AND OF TEST RESULTS

Hard copies of all documents pertaining to tests and inspections are kept on file for 5 years, and are available upon request for evaluation by the customer or their representative on SOLENO premises. That includes ESC reports.

8 QUALITY CONTROL TESTING FACILITIES

The Quality Assurance Director is responsible for providing the necessary infrastructure to conduct tests according to applicable standards in every plant, and to ensure that the tests are carried out by a Quality Controller who is qualified according to the requirements established by SOLENO.

Copies of applicable standards as well as the Quality Manual are provided by the Quality Assurance Director to the Quality Controller.

SOLENO laboratories are equipped with the equipment necessary to carry out all required tests on site.

Each Quality Controller is responsible for maintaining a current file for every piece of equipment, which contains the following information:

- Calibration certificates;
- Manufacturer's instructions (when available).

Equipment should be calibrated at least 1 per year by a specialized laboratory. Calibration is traceable to the national calibration standard when it is possible to do so, or calibrated in compliance with an ASTM standardized procedure. A calibration certificate confirms the method used or the traceability to the source calibration standard.

Repairs conducted on equipment are recorded in the designated file in the laboratory and the testing facilities maintain records of all ESC reviews and actions taken to resolve deficiencies.

9 QUALITY CONTROLLER QUALIFICATION

SOLENO selects its personnel according to the criteria established in the employee files, and all information and training records are available for review from the human resources department.

Quality Controllers are trained as laboratory technicians or equivalent. They have two weeks training in our laboratories in order to observe in detail the application of pertinent standards (AASTHO, BNQ, CSA, and ASTM), the operation of equipment, the procedures to be used, calculations required, and reporting. Witness-verification (audit) is performed on an annual basis to insure that each Quality Controller is able to correctly perform each of the required tests. Re-training is provided when a test method is revised. All the training is documented and recorded by the Quality Assurance Director, this documentation will be maintained at each facility where quality control testing occurs and is available for review.

10 IDENTIFICATION, STORAGE, DELIVERY AND HANDLING OF FINISHED PRODUCTS

10.1 IDENTIFICATION OF PIPE

Each open-profile smooth interior pipe is marked with indelible ink inside the pipe with the following production lot information:

Work team number
Production Line
Length number
Date (Day /month / year)

For single-wall pipe, a yellow tag containing the same information is attached to the pipe.

For all pipes, permanent marking is molded or printed on the pipe exterior according to the particular standards that apply. All permanent markings include, as a minimum, the SOLENO trademark, nominal pipe size, two-letter plant code, and reference standard eg M-294. This combination of permanent and indelible markings provides complete identification and full traceability of the pipe.

10.2 HANDLING AND STORAGE OF PIPE

10.2.1 EQUIPMENT

SOLENO uses forklift loaders. The equipment must permit the ease of maneuverability of a pipe without damaging it. The forks must be free of rough edges that could damage the surface of the pipe. The loader must be capable of lifting pipe to a height of 4 or 5 meters for train cars and 3 or 4 meters for trucks.

10.2.2 STOCK PILING

A protective covering is not necessary for outdoor storage of pipe. The pipe is stored in separate stacks (according to size and category) to facilitate locating the right product at loading time and in order to avoid unnecessary handling. The stacks are laid out in pyramids. The lower rows are supported or tied to avoid the movement of pipe under the weight of the upper rows.

10.2.3 STORAGE SITE

Pipe is stored directly on the ground so the surface needs to be level. The surface of the lot can be gravel, sand, grass or snow, but must be free from rocks or any rubbish that could damage the pipes or cause the stacks to be unstable.

11.0 INTERNAL AUDIT

Every SOLENO laboratory is audited by various accreditation organizations (see Table 3) and is inspected by the Director, Quality Assurance or his/her superior at least once a year to ensure that SOLENO's quality program is respected. The following elements are verified at that time:

Calibration of equipment
Sampling methods for resins and the control of lots
Sampling and test methods for pipe
Product certification
Inspection and test reports
Non-compliance reports

TABLE 3 – Audit Frequency

	Mc Adam	**Iberville**	**~~St-Nicolas~~**	**Hagersville**
BNQ	2 / year	2 / year	~~2 / year~~	2 / year
CSA	2 / year	2 / year	~~1 / year~~	2 / year
PPI	1 plant / year			
ESC	1 / year	1 / year	~~1 / year~~	1 / year
ISO (SGS)		1 / year		

12.0 ANNUAL SUBMISSION OF PIPE SAMPLES TO AN INDEPENDENT LABORATORY ~~THE NTPEP~~ AND RELEASE OF DATA TO THE ESC.

SOLENO will permit DOT inspectors access to its facilities. SOLENO shall have an independent laboratory ~~NTPEP~~ evaluate two sizes of pipe in accordance with M294 on an annual basis for each manufacturing plant furnishing the pipe. A DOT inspector will select and label the samples to be tested. Each sample will be a split sample, with the manufacturer performing comparative testing, the results of which will be furnished to the ESC.

~~13.0 STATISTICAL ANALYSIS OF TEST RESULTS~~

~~SOLENO measures the following variables during the in-process and final QC checks.~~

~~In-process checks;~~

1) ~~Dimensional - Range check, 8 to 16 observations per sample~~
2) ~~Weight per unit of length - 24 observations per lot~~

~~Final QC check;~~

1) ~~See table 2 for description and frequency of tests.~~

~~These above mentioned results are incorporated into the following control charts;~~

1) ~~X bar chart to track the average value being measured along with establishing statistically significant Upper and Lower control limits (Ucl and Lcl).~~
2) ~~R charts to track the variation within the acceptable range.~~

~~Acceptance plan for in process and final QC checks~~

1) ~~If two consecutive points plotted on the charts show positive deviations above the center or negative deviations below the center line, the process is considered to be trending to an out of control situation and actions are to be taken to regain control.~~

2) ~~If at any point, the plotted observation falls above the Ucl or below the Lcl, the process is immediately stopped. All product produced since the last control check is then quarantined according to our standard procedure. Corrective actions are taken before restarting the process.~~

~~Acceptance plan for final QC check~~

~~In addition to the above, the final checks have minimum and maximum absolute values. If a test fails on one occasion, the lot is quarantined and further sampling (depending on the test) and testing is done.~~

APPENDIX 1

Resume – Director, Quality Assurance

(This resume has been removed from the document and is submitted under separate cover as per ESC request, 12/04)

APPENDIX II

Report

EQ-QUA-08
RAW MATERIAL INSPECTION
Date: 2006-05-01, REV: 4
(1 page)

(EQ-QUA-08, rev 4)

Fournisseur / Supplier: _____

Numéro de Lot / Lot number
(# bon commande Soleno / Soleno's purchase order #): _____

Date de livraison / Delivery date: _____

HDPE Vierge / Virgin ❑ HDPE recyclé / recycled ❑ Noir de carbone / Carbon black ❑

Silo # : 1 ❑ 2 ❑ 3 ❑ 4 ❑ 5 ❑ 6 ❑ 7 ❑ Boîtes/Box ❑

Nombre de boîtes / Quantity of boxes : _____ **Test sur la boîte # / Test on box # :** _____

Résultats du Fournisseur / Supplier's results:

Indice de Fluidité / Melt index	Densité / Density	Noir de Carbone Carbon black	Cendres Ashes
g/10min	g/cm^3	%	%

Résultats d'inspection Inspection results:

Indice de Fluidité / Melt index	Densité / Density	Noir de Carbone Carbon black	Cendres Ashes
	1.	M1.	
	2.	M2.	
	3.	M3.	
	4.	M4.	

Résultats/ Results:

Indice de Fluidité / Melt index	Densité / Density	Noir de Carbone Carbon black	Cendres Ashes
g/10min	g/cm^3	%	%

Points à vérifier Checking points

Réception du certificat d'analyse / Certificate of analysis received: oui / yes❑ non / no❑

Classification de cellule / Cell class: conforme / compliant❑ Non-conforme / Non-compliant ❑

Présence des sceaux / Presence of seals: oui / yes❑ non /no❑

Conforme / Compliant❑ Non Conforme /Non-Compliant ❑

Rapport de non conformité # / Non-compliance report # ☐

Durée du déchargement / Unloading time : **NO du Registre / Register NO :** ☐

Départ / Start : _____ Fin / End : _____

Vérifié par / Inspected par : _____ **Date :** _____

APPENDIX III

Report

EQ-QUA-07
INSPECTION EN COURS DE FABRICATION /
INSPECTION DURING THE MANUFACTURING PROCESS
Date: 2006~~5~~-01-~~18~~06, REV : ~~2~~6
(2 pages)

INSPECTION EN COURS DE FABRICATION
INSPECTION DURING THE MANUFACTURING PROCESS

EQ-QUA-07 **Date: 2006-01-06** **Revision : 6**

Date(ay/mm/jd) : / / Dia. (mm) : _____ Usine / plant : _____ R _____ Ligne / line _____

Norme applic. / Applic. Stand. NQ 3624- Aucune/ None ❑ 115 ❑ 110 ❑ 120 ❑ CSA B182.8 ❑ AASHTO M252 ❑ M294 ❑

Test # 1 – angle _____ Heure de fabric. / Product time : Équipe / Team IMPACT 1 2 3

D.I. / I.D. mm Moy. / Ave. C ❑ ❑ ❑

D.E / O.D. mm Moy. / Ave N/C ❑ ❑ ❑

Ovalisation / Out of roundness BNQ % CSA ± mm

Poids / Weight (g) W Long. / length (mm) L W/L (kg/m)

Rigidité / Stiffness (kPa) 5 % 10 % Joints aux lignes de soudure/ Weld integrity of C ❑ N/C ❑

AASHTO: Compression à 20% / Flattening at ❑ C ❑ N/C BNQ 20% 12'' et moins / less than C ❑ N/C ❑

1	2	3	4	5	6	7	8	Écart/Range

Commentaires / Comments :

Test # 2 – angle _____ Heure de fabric. / Product time : Équipe / Team IMPACT 1 2 3

D.I. / I.D. mm Moy. / Ave. C ❑ ❑ ❑

D.E / O.D. mm Moy. / Ave N/C ❑ ❑ ❑

Ovalisation / Out of roundness BNQ % CSA ± mm

Poids / Weight (g) W Long. / length (mm) L W/L (kg/m)

Rigidité / Stiffness (kPa) 5 % 10 % Joints aux lignes de soudure/ Weld integrity of C ❑ N/C ❑

AASHTO: Compression à 20% / Flattening at ❑ C ❑ N/C BNQ 20% 12'' et moins / less than C ❑ N/C ❑

1	2	3	4	5	6	7	8	Écart/Range

Commentaires / Comments :

Test # 3 – angle _____ Heure de fabric. / Product time : Équipe / Team IMPACT 1 2 3

D.I. / I.D. mm Moy. / Ave. C ❑ ❑ ❑

D.E / O.D. mm Moy. / Ave N/C ❑ ❑ ❑

Ovalisation / Out of roundness BNQ % CSA ± mm

Poids / Weight (g) W Long. / length (mm) L W/L (kg/m)

Rigidité / Stiffness (kPa) 5 % 10 % Joints aux lignes de soudure/ Weld integrity of joints C ❑ N/C ❑

AASHTO: Compression à 20% / Flattening at ❑ C ❑ N/C BNQ 20% 12'' et moins / less than C ❑ N/C ❑

1	2	3	4	5	6	7	8	Écart/Range

Commentaires / Comments :

INSPECTION EN COURS DE FABRICATION
INSPECTION DURING THE MANUFACTURING PROCESS

EQ-QUA-07 **Date: 2006-01-06** **Revision : 6**

Test # 4 – angle _____ Heure de fabric. / Product time							:	Équipe / Team		IMPACT 1 2 3
D.I. / I.D. mm										
								Moy. / Ave.		C ❑ ❑ ❑
D.E / O.D. mm								Moy. / Ave		N/C ❑ ❑ ❑
Ovalisation / Out of roundness	BNQ	%	CSA	± mm						
Poids / Weight (g) W		Long. / length (mm)		L		W/L (kg/m)				
Rigidité / Stiffness (kPa) 5 %		10 %		Joints aux lignes de soudure/ Weld integrity of joints C ❑ N/C ❑						
AASHTO: Compression à 20% / Flattening at 20% ❑ C ❑ N/C				BNQ 20% 12'' et moins / less than C ❑ N/C ❑						
1	2	3	4	5	6	7	8	Écart/Range		

Commentaires / Comments :

FLEXION			ALLONG. / EXT. (%)		COMPRESSION CSA 60%	BNQ 20% (15'' et plus / or more)
	C	N/C	1		Test #	Test #
1	❑	❑	2		C ❑ N/C ❑	C ❑ N/C ❑
2	❑	❑	3		Dépla. /Deflec : mm	Dépla. /Deflec : mm
3	❑	❑	Moy. / Ave.		Vitesse /speed : mm/min	Vitesse /speed : mm/min

FLUIDITÉ MELT	NOIR CARBONE CARB. BLACK	PERFORATION AASHTO	PERFORATIONS (BNQ)
(g / 10 min)	%	Heure / time :	Heure / time :
		Ø > 5mm < 10mm : Oui /yes❑ Non / no ❑	# N/C perf. : < 20%
DENSITÉ / DENSITY	**CENDRES / ASHES**	# de perforations / # of perforations	A total: > 32 cm²/m
(g / cm)	%	H: L:	Perf < 2mm (NQ3624-115) Oui /yes❑ Non / no ❑
		A total: cm²/m	ESCR ❑ C ❑ N/C

Valonnement intérieur du SFM / Inside deviation of SFM (Tuyau US /US pipe: < 6mm ❑ > 6mm ❑

ÉPAISSEUR DES PAROIS / WALL THICKNESS (6 fois pour AASHTO seulement / 6 times for AASHTO only)

	Paroi Extérieur / outside Wall				Paroi intérieur / Inside wall			
Heure / time	1	3	5	7	1	3	5	7
:								
:								
:								
:								
:								
:								

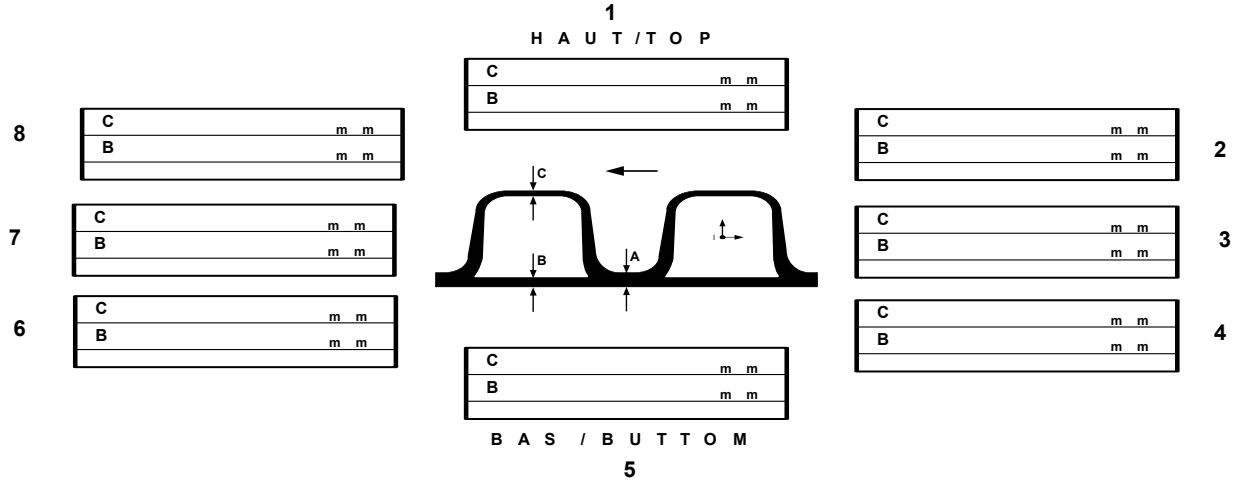
❑ C ❑ N/C	Vérifié par / Checked by :	Date:

APPENDIX IV

Report

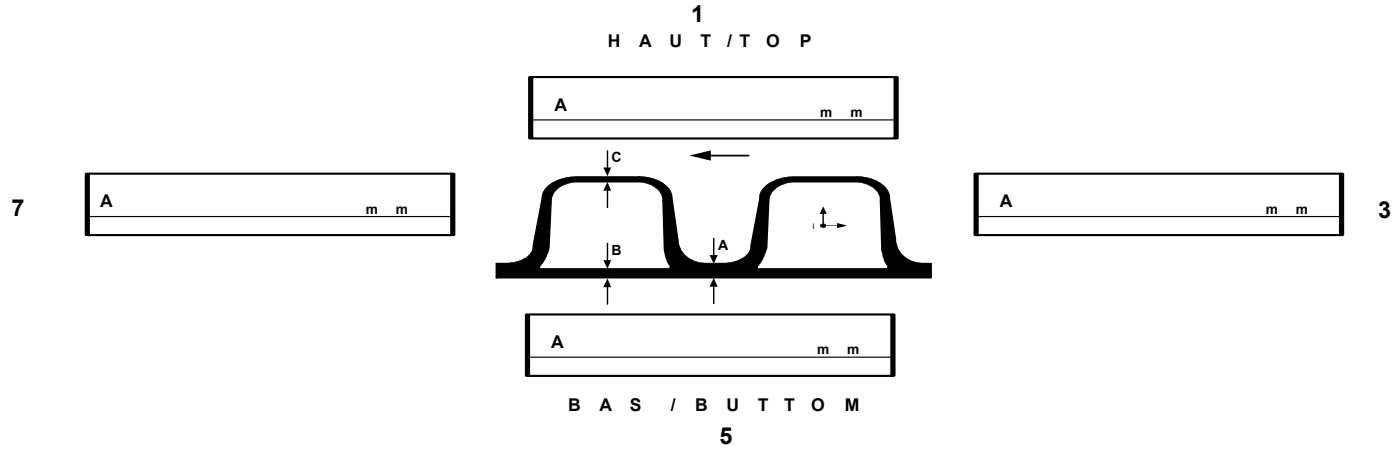
EQ-QUA-12
Répartition - Distribution
Date: 2006-03-09 rev 01

EQ-QUA-12 rev 01



VALONNEMENT / DÉVIATION : _____ mm < 6 mm

DOUBLE PAROI / DOUBLE WALL (A) : *Enlignement du die / die aligment*



D a t e : _____ H e u r e / T i m e : _____ Q C : _____

Paroi intérieur minimale (mm) / Minimal inside wall thickness (mm)

	100mm (4")	150mm (6")	200mm (8")	250mm (10")	300mm (12")	375mm (15")	450mm (18")	525mm (21")	600mm (24")	750mm (30")	900mm (36")	1050mm (42")	1200mm (48")
BNQ et CSA	0.51	0.51	0.64	0.64	0.89	0.89	1.27	1.27	1.27	1.27	1.27	1.27	
AASHTO	0.5	0.5	0.6	0.6	0.9	1.0	1.3	1.5	1.5	1.5	1.7	1.8	1.8
SOLENO	**0.55**	**0.55**	**0.65**	**0.65**	**1**	**1.3**	**1.5**	**1.5**	**1.6**	**1.8**	**1.8**	**2**	**2**

APPENDIX V

Report

EQ-QUA-10
JOINT D'INTÉGRITÉ / JOINT INTEGRITY, M252
Date: 2004-11-24, REV : 1
(1 page)

(EQ-QUA-10, rev 1)

Application : UNIFLO enroulé / Coil UNIFLO

Diamètre / Diameter :100 à/ to 250mm

1. Assembler le tuyau (150mm de long min.) avec l'accessoire désiré / Joint the pipe (150 mm min length) with fitting
2. Ajouter une masse de 0.090kg/mm / Add weight of 0.090kg/mm

mm	**Poids / Weight (kg)**
100	9
150	13.5
200	18
250	22.5

3. Trois tests pour chaque accessoire / Three tests for each fitting

Accessoire / Fitting		**Tuyau / Pipe**			
Description de l'accessoire Fitting description	Lot	Diamètre Diameter	Date de fabrication **Production date**	Conforme Compliant	Non-Conforme Non-Compliant
				❑	❑
				❑	❑
				❑	❑
				❑	❑
				❑	❑
				❑	❑
				❑	❑
				❑	❑
				❑	❑
				❑	❑
				❑	❑

APPENDIX VI

Report

EQ-QUA-11
JOINT D'INTÉGRITÉ / JOINT INTEGRITY, M294
Date:2004-11-24, REV : 1
(1 page)

(EQ-QUA-11, rev 1)
Application :Aucune spécification / No specification
Diamètre / Diameter :300 à / to 1200mm

1. Utiliser un échantillon de 300mm de long min./ Use a sample length of 300 mm min.
2. Faire un montage de 600mm de long min avec l'accessoire installé au centre. / Assemble a pipe at lest 600mm with a fitting at the center.
3. Mettre le montage sur la machine à compression / Load the connection into the compression machine.
4. Régler la vitesse à 12.5mm/min./ Set the speed to 12.5mm/min.
5. Compresser l'assemblage jusqu'à 20% du diamètre nominal. / Reduce the inside diameter of 20%

mm	**Déformation à atteindre Deformation to obtain (mm)**
300	60
375	75
450	90
525	105
600	120
750	150
900	180
1200	240

6. Inspecter le montage durant le test et après le test. / Inspect the assemble during and after test.
4. Mesure la distance maximal (radial distance) entre le tuyau et l'accessoire durant le test et après le test. / Measure the maximum distance (radial distance) between the pipe and fitting during the test and after the test.

Accessoire / Fitting		**Tuyau / Pipe**			
Description de l'accessoire Fitting description	Lot	Diamètre Diameter	Date de fabrication Production date	Conforme Compliant < 5mm	Non-Conforme Non-Compliant > 5mm
				❑	❑
				❑	❑
				❑	❑
				❑	❑
				❑	❑

APPENDIX VII

Report

EQ-PRO-05
CONTRÔLE QUALITÉ OPÉRATEUR / OPERATOR QUALITY CONTROL
Date: 06-04-10 rev 06

(EQ-PRO-05 rev 06)

AA/YY MM/MM JJ/DD

Date _____ _____ _____ Équipe / Team: _____ Ligne /Line : _____

Poids min. / Min. weight: _____ Kg/m Poids max. / Max weight: _____ Kg/m

Drain – Solflo -Uniflo : prendre le poids 3 fois par quart de travail
take the weigth 3 time by shift

Solflomax- Unimax : prendre le poids à chaque heure
take the weigth every hours

Heure Time	# Barre Length #	Poids Weight (g)	Longueur Length (mm)	Poids Weight (Kg / m)	Initiales Initials
:					
:					
:					
:					
:					
:					
:					
:					
:					
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